

## **CLAIMS**

The invention is:

1. An apparatus for manufacture of foam structures, comprising:  
a platform for supporting at least two foam components to be welded together;  
a foam component positioning mechanism for positioning a first foam component relative to a second component, and  
a foam welding head mounted to travel along an interface between the first and second foam components and operative to weld the first and second foam components together.
2. The apparatus for manufacture of foam structures of claim 1 wherein the foam component positioning mechanism is operative to apply pressure to one of the first or second foam components relative to the other foam component.
3. The apparatus for manufacture of foam structures of claim 1 further comprising a foam cutter operative to cut a portion of the first or second foam component proximate to a weld between the first and second foam component.
4. The apparatus for manufacture of foam structures of claim 3 wherein the foam cutter is located on the foam welding head.
5. The apparatus for manufacture of foam structures of claim 1 wherein the foam welding head comprises a blade which passes between the first and second foam components, and a heat source proximate to the blade.
6. The apparatus for manufacture of foam structures of claim 1 wherein the foam welding head is mounted and powered to travel a linear path along an interface between the first and second foam components.

7. The apparatus for manufacture of foam structures of claim 1 wherein the foam welding head is mounted and powered to travel a path proximate to the foam component positioning mechanism.
8. The apparatus for manufacture of foam structures of claim 1 further comprising a trimmer for trimming at least one of the foam components.
9. The apparatus for manufacture of foam structures of claim 8 wherein the trimmer comprises a cutting blade.
10. The apparatus of claim 1 further comprising a gripping mechanism for gripping an internal component for combination with the first or second foam components.
11. The apparatus of claim 10 wherein the gripping mechanism comprises one or more prongs which project from the platform.
12. The apparatus of claim 11 wherein the one or more prongs are operative to move toward an edge of the platform.
13. An apparatus for manufacture of foam structures comprising:
  - a platform for supporting a first foam component and a second foam component in contact with the first foam component at an interface;
  - a clamp for maintaining the second foam component in a position relative to the first foam component;
  - and a welding head operative to weld the first foam component to the second foam component at the interface, the welding head having an interface blade and a nozzle configured to pass through the interface.

14. The apparatus for manufacture of foam structures of claim 13 further comprising a trimmer operative to trim one of the foam components.
15. The apparatus for manufacture of foam structures of claim 14 wherein the trimmer is mounted on the welding head.
16. The apparatus for manufacture of foam structures of claim 13 further comprising at least one gripper associated with the platform.
17. The apparatus for manufacture of foam structures of claim 13 further comprising a heated gas source connected to the nozzle of the welding head.
18. The apparatus for manufacture of foam structures of claim 13 wherein the welding head is mounted upon a track for movement relative to one of the foam components on the platform.
19. The apparatus for manufacture of foam structures of claim 13 wherein the clamp is configured to press one of the foam components against another of the foam components at an interface between the foam components to be welded together by operation of the welding head.
20. The apparatus for manufacture of foam structures of claim 13 further comprising a rail adjacent to the platform and the welding head.
21. The apparatus for manufacture of foam structures of claim 13 further comprising a heating element attached to the welding head.
22. The apparatus for manufacture of foam structures of claim 13 wherein the nozzle of the welding head comprises ports for directing heated gas to the interface of the foam components.
23. An apparatus for forming a weld between two separate foam components, the apparatus comprising:

a platform for supporting first and second foam components;

a rail proximate to the platform and located for positioning at least one of the foam components proximate to the rail;

a welding head mounted to translate upon a track generally aligned with the rail, the welding head having an interface blade positioned to travel between an interface of the two foam components, and a nozzle adapted to distribute a heated gas at the interface of the two foam components.

24. The apparatus of claim 23 further comprising a second rail, a second track and a second welding head associated with the platform.

25. The apparatus of claim 23 further comprising a drive mechanism operative to drive the welding head along the track and along the interface of the foam components.

26. The apparatus of claim 23 further comprising a clamp operative to press one of the foam components against another of the foam components.

27. The apparatus of claim 23 wherein the clamp is generally aligned with one of the rails.

28. The apparatus of claim 23 further comprising a trimmer operative to trim one of the foam components.

29. The apparatus of claim 28 wherein the trimmer is in the form of a circular rotating blade.

30. The apparatus of claim 23 further comprising a welding energy source coupler connected to the welding head.

31. The apparatus of claim 23 further comprising a gripping mechanism for gripping a component relative to the platform.

32. The apparatus of claim 31 wherein the gripping mechanism is in the form of one or more prongs operative to engage a component on the platform.

33. An apparatus for forming a bond between two or more foam components by thermal welding, the apparatus comprising:

a platform for supporting two or more foam components;  
a clamp for applying pressure to at least one of the foam components,  
and a welding head having an interface blade configured to fit between foam components to be welded together, the welding head having a nozzle for distributing a heated gas.

34. A device for combining two or more foam components together by thermal welding, the device comprising:

an interface blade adapted for placement at an interface of foam components to be fused together;

a nozzle proximate to the interface blade, the nozzle having one or more ports for distributing a heated gas at the interface of the foam components, the nozzle located substantially within a nozzle shroud proximate to the interface blade.

35. The device of claim 34 further comprising a coupling for providing a welding energy source to the nozzle.

36. The device of claim 34 further comprising a body to which the interface blade and nozzle are attached.

37. The device of claim 34 further comprising one or more guides adapted for contact with one or more foam components.

38. The device of claim 37 wherein the one or more guides are in the form of rollers.